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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/554,161

Applicant(s)

DELL'ACQUA ET AL.

Examiner

PATRICK STAFFORD

Art Unit

2828

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 January 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SD/CS)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

Claims 1-21 amended 28 January 2009.

Claim 22 added 28 January 2009.

Response to Arguments

Applicant's arguments filed 29 January 2009 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-8, 10, 17-18 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nighan et al (U.S. Patent 6,287,298, hereafter '298) in view of Zanger et al (U.S. Patent Application Publication 2004/0071179, hereafter '179) and further in view of Baer (U.S. Patent 5,627,849, hereafter '849).

Claim 1: '298 teaches a diode pumped laser apparatus for generating a visible power beam, the laser apparatus comprising:

a linear laser cavity (col. 5, lines 29-30 and Fig. 3, part 28) having crystals (col. 5, lines 22-25 and Fig. 3, parts 22, 34 and 36);

a plurality of reflectors that are highly reflective at a fundamental wavelength of a laser beam generated by the laser cavity (col. 10, lines 2-4, lines 8-10 and Fig. 3, parts 44, 46, and 48), at least one of said reflectors being traversed by a pumping beam (Fig. 3, part 44 is traversed by part 30), and reflecting at said fundamental wavelength and a second harmonic wavelength with respect to said fundamental wavelength (Fig. 3, part 48), and being highly transmissive at said second harmonic of said fundamental wavelength (Fig. 3, part 46);

an active material (Fig. 3, parts 22 and 34) with linear polarized emission (col. 6, lines 31-35 and Fig. 3, part 34) and with a gain configuration with small thermal aberration for cavity mode (col. 7, lines 41-43), said active material being able to generate said laser beam at the fundamental wavelength (col. 8, lines 6-8);

a non linear crystal, inside said cavity (Fig. 3, part 36) and able to generate a second harmonic of said fundamental wavelength by non critical type I phase matching (col. 6, lines 44-47); and

thermostating means associated with the cavity for temperature locking said cavity , the reflectors, the active material and the nonlinear crystal (col. 6, lines 45-52).

'298 does not explicitly teach the non-linear crystal generating the second harmonic of the fundamental wavelength by critical type I phase matching. However, '179 teaches the use of a non-linear crystal to generate the second harmonic of the fundamental wavelength by critical type I phase matching (paragraph 20, lines 7-9) in order to provide higher stability of laser generation through axis orientation (paragraph 41). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a non-linear crystal

to generate the second harmonic of the fundamental wavelength by critical type I phase matching in order to provide higher stability of laser generation through axis orientation.

'298 and '179 do not explicitly teach the laser cavity having a length that does not exceed ten times the sum of the lengths of the crystals. However, '849 teaches a laser cavity (col. 6, lines 4-8 and Fig. 1, part 10) with multiple crystals (Fig. 1, parts 20, 18), wherein the cavity length does not exceed ten times the sum of the lengths of the crystals (col. 6, lines 7-10) in order to affect the standing waves within the laser resonator (col. 6, lines 4-8). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a laser cavity with multiple crystals, wherein the cavity length does not exceed ten times the sum of the lengths of the crystals in order to affect the standing waves within the laser resonator.

Claim 2: '298 '179, '849 teach the apparatus as claimed in claim 1. '298 teaches the cavity (col. 10, lines 10-11 and Fig. 3, part 44 "resonator") and the optical elements (col. 10, lines 2-4, lines 8-10 and Fig. 3, parts 44, 46, and 48) it comprises are provided to minimize optical losses (col. 10, lines 2-4 and 8-10).

Claims 3 and 22: '298 '179, '849 teach the apparatus as claimed in claim 1. '179 teaches the optical losses at said fundamental wavelength are less than 2% (paragraph 45, lines 1-2).

Claim 4: '298 '179, '849 teach the apparatus as claimed in claim 1. '179 teaches the optical losses at said fundamental wavelength due to thermal aberration are less than 1% (paragraph 45, lines 1-2).

Claim 5: '298 '179, '849 teach the apparatus as claimed in claim 1. '298 teaches the active material is a crystal of Nd:GdVO₄ (col. 5, lines 22-25).

Claim 6: '298 '179, '849 teach the apparatus as claimed in claim 1. '298 teaches the active material is a crystal of Nd:YLF (col. 5, lines 22-25).

Claim 7: '298 '179, '849 teach the apparatus as claimed in claim 1. '298 teaches the active material (10) is a crystal of Nd:YVO₄ (col. 5, lines 22-25).

Claim 8: '298 '179, '849 teach the apparatus as claimed in claim 5. '298 teaches the non linear crystal is LBO (col. 6, lines 37-43).

Claim 10: '298 '179, '849 teach the apparatus as claimed in claim 1. '298 teaches the visible beam is a beam at the limit of diffraction, or TEM_{0,0} (col. 5, lines 36-39).

Claim 17: '298 '179, '849 teach the apparatus of claim 1. '298 teaches the thermostating means comprise an additional autonomous heat-regulating device to stabilize the temperature of the non linear crystal in autonomous and more precise way than the other elements of the cavity (col. 9, lines 5-7).

Claim 18: '298 '179, '849 teach the apparatus of claim 1. '298 teaches the reflecting means are at least in part obtained by means of reflecting depositions on the laser crystal and/or on the non linear crystal (col. 10, lines 2-4, lines 8-10 and Fig. 3, parts 44, 46, and 48).

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nighan et al (U.S. Patent 6,287,298, hereafter '298) in view of Zanger et al (U.S. Patent Application Publication 2004/0071179, hereafter '179) and Baer (U.S. Patent 5,627,849, hereafter '849) and further in view of Hammons et al (U.S. Patent 6,185,231, hereafter '231)

Claim 9: '298, '179 and '849 teach the apparatus as claimed in claim 5. They do not explicitly teach the non linear crystal is YCOB or GdCOB. However, '231 teaches the use of YCOB (col.

3, lines 42-48) and GdCOB (col. 1, lines 50-55) in order to have a self-frequency doubling and tuning laser. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use YCOB and GdCOB as the non linear crystal in order to have a self-frequency doubling and tuning laser.

Claims 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nighan et al (U.S. Patent 6,287,298, hereafter '298) in view of Zanger et al (U.S. Patent Application Publication 2004/0071179, hereafter '179) and Baer (U.S. Patent 5,627,849, hereafter '849) and further in view of Marshall (U.S. Patent 5,511,085, hereafter '085).

Claim 11: '298, '179 and '849 teach an apparatus as claimed in claim 1. They do not explicitly teach the pumping beam is absorbed in two successive passes through the active material. However, '085 teaches a pumping beam being absorbed in two successive passes through the active material (col. 8, lines 37-42 and Fig. 4, part 1) in order to reduce losses. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a pumping beam being absorbed in two successive passes through the active material in order to reduce losses.

Claims 12-13, 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nighan et al (U.S. Patent 6,287,298, hereafter '298) in view of Zanger et al (U.S. Patent Application Publication 2004/0071179, hereafter '179) and Baer (U.S. Patent 5,627,849, hereafter '849) and further in view of Rigrod (U.S. Patent 3,611,436, hereafter '436).

Claim 12: '298, '179 and '849 teach the apparatus of claim 1. '298 teaches the use of thermostating means for temperature locking the cavity (col. 9, lines 5-7). They do not explicitly teach the thermostating means for temperature locking said cavity and its optical elements comprise a mechanical structure associated to said cavity. However, '436 teaches a cavity with a thermostating means for temperature locking the cavity and its optical elements comprising a mechanical structure (col. 4, lines 8-10 and Fig. 1, part 29) in order to provide minimum transmission losses. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a cavity with a thermostating means for temperature locking the cavity and its optical elements comprising a mechanical structure in order to provide minimum transmission losses.

Claim 13: '298, '179, '849 and '436 teach the apparatus of claim 12. '436 teaches the mechanical structure (Fig. 1, part 29) comprise a structural base, and elements for supporting the optics (Fig. 1, parts 12 and 14 supported by part 29).

Claim 15: '298, '179, '849 and '436 teach the apparatus of claim 12. '436 teaches the temperature of the structural base is regulated by means of an active system (col. 4, lines 1-7).

Claim 16: '298, '179, '849 and '436 teach the apparatus of claim 12. '436 teaches the mechanical structure has the shape of a container, containing the cavity in sealed way (Fig. 1, part 29).

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nighan et al (U.S. Patent 6,287,298, hereafter '298) and Zanger et al (U.S. Patent Application Publication 2004/0071179, hereafter '179) and Baer (U.S. Patent 5,627,849, hereafter '849) and in view of Rigrod (U.S.

Patent 3,611,436, hereafter '436) further in view of Anthon et al (U.S. Patent 4,884,277, hereafter '277).

'298, '179, '849 and '436 teach the apparatus as claimed in claim 12 or 13. They do not explicitly teach the structural base and elements supporting the optics are made of copper or other heat conducting material and associated in thermal contact with each other. However, '277 teaches a laser cavity with a thermostating means with a structural base and supporting elements made of copper (col. 12, lines 14-22) in order to better control the temperature. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a laser cavity with a thermostating means with a structural base and supporting elements made of copper in order to better control the temperature.

Claims 19-21: Regarding claims 19-21, the arguments applied above to the apparatus described with regards to claims 1-18 are applicable to the method claims as well.

Conclusion

1. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period

will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to PATRICK STAFFORD whose telephone number is (571)270-1275. The examiner can normally be reached on M-Th 7:30-5 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, MinSun Harvey can be reached on (571) 272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/P. S./
Examiner, Art Unit 2828

/Minsun Harvey/
Supervisory Patent Examiner, Art Unit 2828